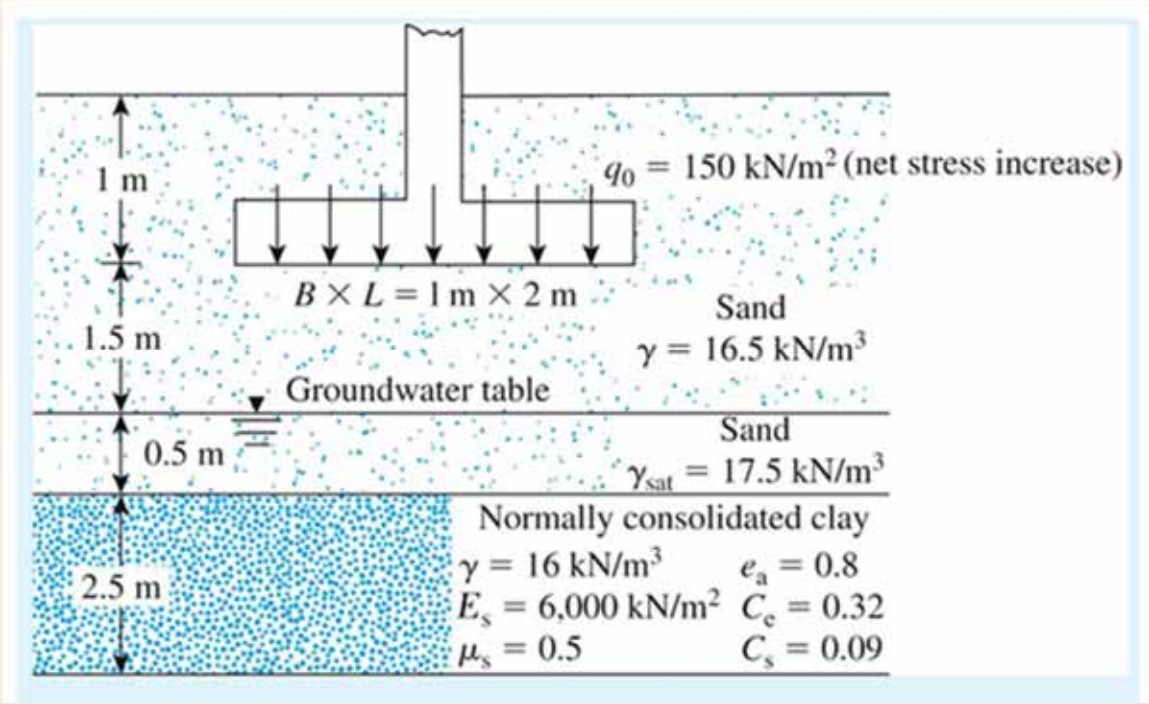
# CEE430/530 Review

# Westergaard Problem




The clay is normally consolidated so we use the following equation:

$$S_c := \frac{(C_c \cdot H_c)}{1 + e_o} \cdot \log\left(\left(\frac{\sigma'_o + \Delta\sigma'_{avg}}{\sigma'_o}\right)\right)$$

# Westergaard Continued

$\sigma'_o$ = (2.5)(16.5)+(0.5)(17.5-9.81)+(1.25)(16-9.81) = 52.84 kN/m$^2$

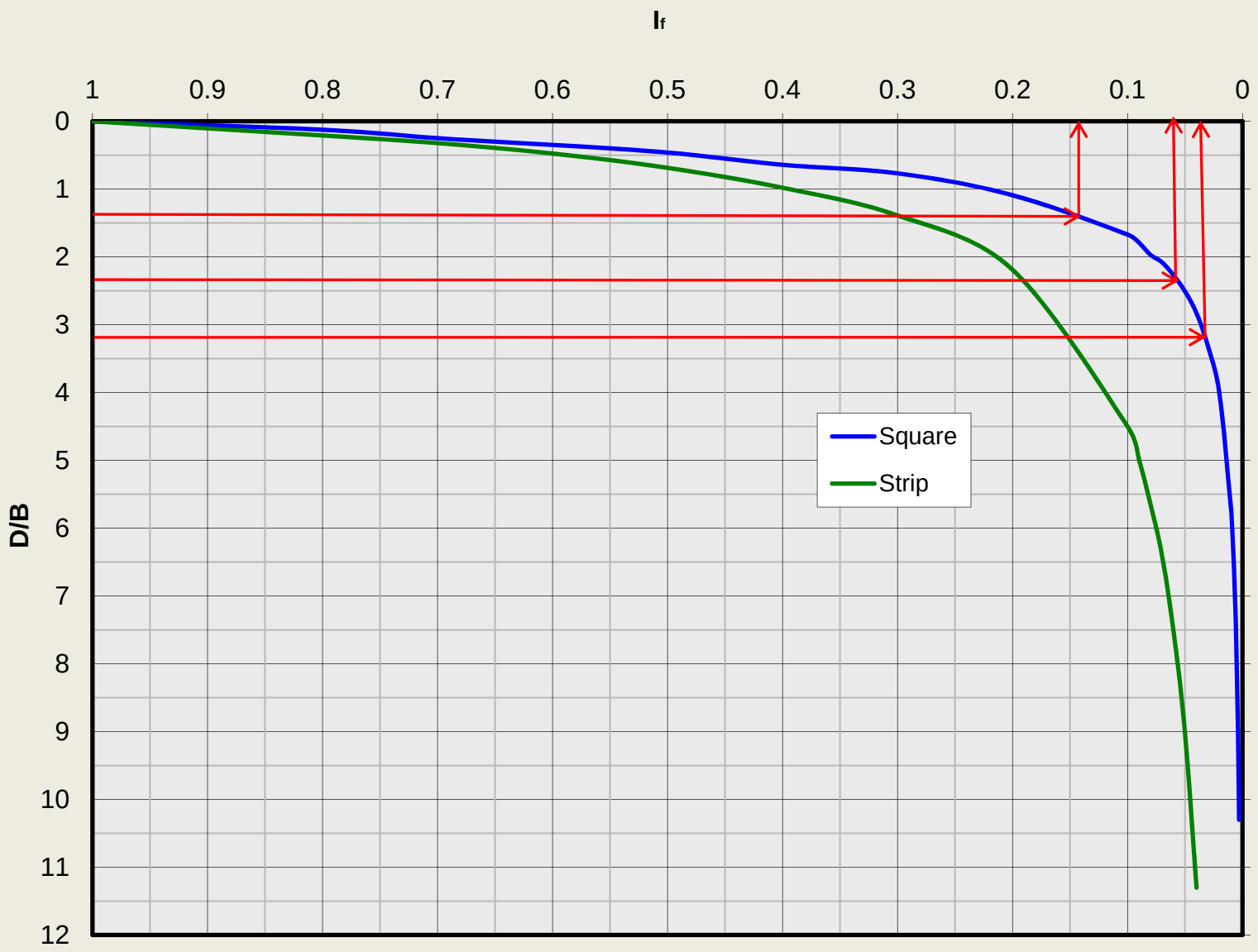
Next, determine average change in pressure in the clay layer.

$$\Delta\sigma_{avg} := \frac{1}{6}\cdot\left(\Delta\sigma'_t + 4\cdot\Delta\sigma'_m + \Delta\sigma'_b\right)$$

| Depth (m) | Z/B | $I_f$ | $\Delta\sigma$ |
|---|---|---|---|
| 2.00 | 1.43 | 0.13 | 0.13(150)=19.5 |
| 3.25 | 2.32 | 0.06 | 0.06(150)=9.0 |
| 4.50 | 3.21 | 0.03 | 0.03(150)=4.5 |

$$\Delta\sigma_{avg} := \frac{1}{6}\cdot[19.5 + (4)\cdot(9) + 4.5] = 10 \text{ kN/m}^2$$

$$S_C := \frac{(0.32\cdot 2.5)}{1 + 0.8}\cdot\log\left[\frac{(52.84 + 10)}{52.84}\right] = 0.033\text{m or } 33\text{mm}$$


If
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
D/B
0
1
2
3
4
5
6
7
8
9
10
11
12
Square
Strip